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ABSTRACT

In 1988-89 the Connecticut Vocational-Technical School System initiated a program for the ongoing review and upgrading of all trade and academic curricula used in the system's 17 schools to insure that each curriculum is consistent with current standards. Every 3 years the Curriculum Steering Committee for the trade or academic subject conducts a review and an analysis to identify outdated content, approaches, or materials. The revised curriculum incorporates the latest thinking of instructors who teach the subject, suggestions from authorities in the mathematics field, and current instructional approaches in the field of education. This curriculum is intended as a plan for learning topics in algebra, trigonomery, and geometry, and as an aid to the mathematics instructor to prepare students for membership in society. The document is separated into several sections: the Vocational-Technical School Mathematics Sequence; Career Relationships and Requirements; Instructor's Goals; Students' General Competencies; a Common Core of Learning; Personal Goals for Students; Pre-Tech Math History; and a series of 30 units in 3 categories--algebra, trigonometry, and geometry. Each unit provides suggested instructional time, unit objectives, and a list of student competencies required of students after completing the unit. The first category contains 11 algebra units discussing the topics of word problems, factoring, fractions, fractional equations, systems of equations, graphing, exponents, radicals, quadratic equations, inequalities, and ratio, proportion, and variation. The second category contains 11 trigonometry units discussing the topics of trigonometric ratios, right triangles, functions of angles of any size, trigonometric identities, radius measure, special angles, composite angle formulas, solving oblique triangles, vectors, and graphs of trigonometric functions. The final supplementary category contains eight geometry units dealing with plane figures, measurement, the right triangle, circles, prisms, cylinders, pyramids and cones, and the sphere. Computer software and a textbook are suggested. (MDH)

CT89CD03

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VT-610

PRE-TECH MATHEMATICS

VOCATIONAL-TECHNICAL SCHOOL SYSTEM
CONNECTICUT DEPARTMENT OF EDUCATION

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SE052 382

PRE-TECH MATHEMATICS

CURRICULUM

PREPARED BY EASTCONN
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PREPARED FOR:

CONNECTICUT STATE DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION
VOCATIONAL-TECHNICAL SCHOOL SYSTEM
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1989

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* This material has been included within this curriculum to address the needs of students who have successfully completed Units I through XXII.

FOREWORD

In 1988-89 the Connecticut Vocational-Technical School System initiated a program for the ongoing review and upgrading of all trade and academic curricula used in the System's seventeen schools to insure that each curriculum is consistent with current standards. Each curriculum is first reviewed by the appropriate Curriculum Steering Committee. That is done during the third year following the curriculum's last revision. The Curriculum Steering Committee for the trade or academic subject conducts a review and an analysis to identify outdated content, approaches, or materials. Any deficiencies are noted. During the following year a sub-committee of the Steering Committee prepares a revision of the curriculum incorporating all required changes.

This publication is the result of such a revision. The curriculum incorporates (a) the very latest thinking of instructors who teach the subject, (b) suggestions from authorities in the mathematics field, and (c) current instructional approaches in the field of education.

Special appreciation is extended to the instructors who provided input prior to the beginning of the curriculum revision. We also appreciate the suggestions and significant contribution of Ronald E. Brann, Consultant, Connecticut State Department of Education, Vocational, Technical & Adult Education, Vocational-Technical School System.

Jerry C. Bencivenga, Consultant
Vocational-Technical School System

John Bruno, Steering Committee Chairman
August 1989

INTRODUCTION

The following curriculum is intended as a plan for learning and an aid to the instructor whose responsibility it is to teach mathematics and to prepare students for involved and productive membership in society. The curriculum document consists of several sections. Each of the sections is explained below.

Career Relationships and Requirements. The instructor is the key person in the student's preparation for adult society. This section of the curriculum reminds the Instructor of some career related informational sources which should be shared with the students.

Common Core of Learning (CCL). Each of the General and Personal Goals for Students directly relates to a component of Connecticut's Common Core of Learning. However, the instruction and experiences which are provided to assist a student toward achievement of a competency may address other CCL components in varying degrees. The CCL Matrix illustrates the full range of CCL components which are effected. Instructors should refer to the complete list of CCL components found in the Appendices.

Instructor's Goals. These are the competencies expected of every successful student in the program. Competencies are stated in terms of expected student outcomes. All subsequent instructional decisions should show a relationship to one or more of these competencies.

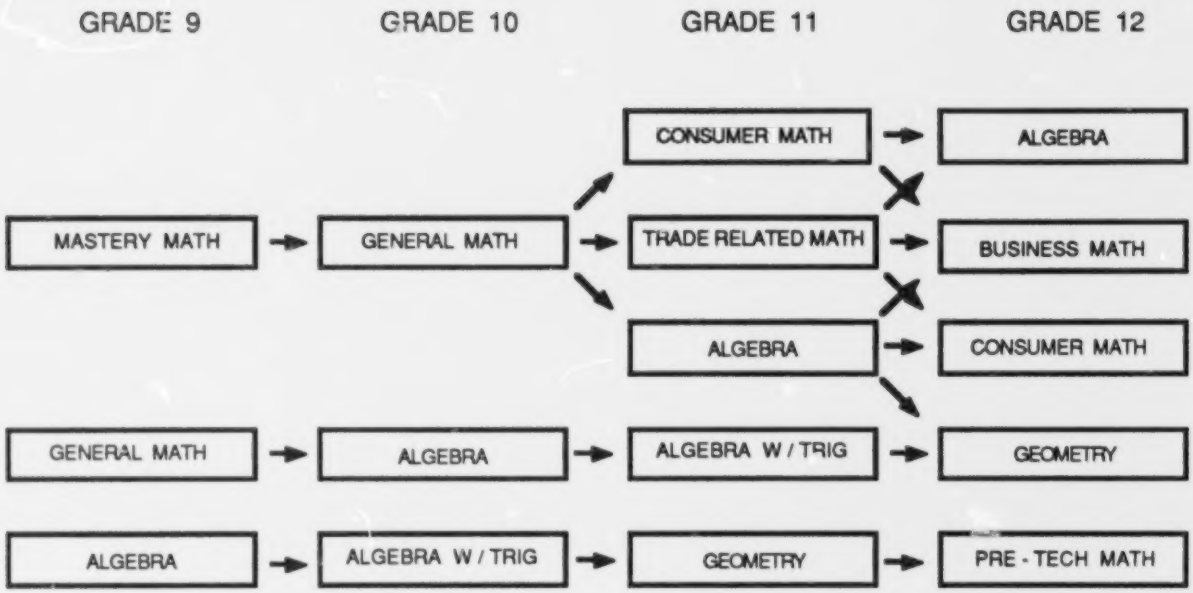
Personal Goals for Students. A successful citizen and tradesperson becomes such through the mastery of essential knowledge and skills plus the internalization of positive attitudes and values. "Personal Goals for Students" calls attention to some behaviors which should be demonstrated by responsible citizens.

Course Outline. Course content, specific objectives, and related activities are organized into coherent blocks of instruction. They may be called units or they may simply be identified by a designated period of time. Contained within each block are the differentiated Student Competencies and an outline of the essential content necessary for achievement of them. The units contain suggested activities and suggested approaches to assessment. In all cases, they are suggestions not prescriptions. The instructor is expected to commit to the goals and competencies but alternative means may be employed to achieve them.

Appendices. The appendices offer brief lists of resources appropriate to the successful completion of the program. In addition to the obvious use of these pages, the instructor may refer to the appendices when ordering supplies.

VTSS

MATHEMATICS SEQUENCE



All voc-tech schools should schedule math students by ability. When students need to learn a new math skill out of sequence for use in their shop, the shop instructor should teach it during theory.

We encourage our students to challenge themselves with advanced course work to stretch the limits of their ability and not just accept minimum achievement as a goal.

In addition, scheduled computer-assisted math is available in all schools to tutor students in need.

Finally, students should not be tracked in any one sequence. Any students showing success in a mathematics course should be considered for advanced courses. For this reason, classes are not limited to a single grade.

3-17-89

CAREER RELATIONSHIPS AND REQUIREMENTS

Successful completion of this course provides a student with the basic understanding of the math skills needed to enhance their career. He or she should also have an understanding and appreciation of the vital role of mathematics in everyday transactions. Through this knowledge the student will be able to benefit as a worker, consumer or business person, and be a more productive citizen. The mathematical principles constitute a foundation which the student can continue to learn and add to his/her individual knowledge. Students who wish to consider career options in mathematics should be encouraged to consult the Connecticut Information System (COIS) and the Occupational Outlook Handbook (United States Department of Labor) to identify related occupations and their requirements.

INSTRUCTOR'S GOALS

The Instructor will:

1. Plan learning experiences which consist of a logical introduction, sufficient development and guided practice for basic understanding and a summarizing conclusion.

2. Select delivery strategies which take into account the different interests, abilities, learning styles, and expectations of Vocational-Technical School students;

3. Plan and present lessons that demonstrate how mathematics relates to the student's selected vocation or trade area.

4. Plan instruction geared to ability levels of the students in each class.

5. Employ a variety of instructional techniques.

6. Use a variety of evaluative tools and techniques.

7. Encourage students to use their creativity and initiative.

8. Present learning experiences in such a way as to elicit higher-level thinking and critical thinking;

STUDENTS' GENERAL COMPETENCIES

The Student will:

1. Use the rules of Algebra to solve stated word problems.
2. Find solutions to systems of equations.
3. Graph Equations for Solutions.
4. Solve quadratic equations.
5. Solve inequalities.
6. Solve ratio, proportion, and variation problems.
7. Identify the six trigonometric ratios.
8. Solve for unknowns in right triangle problems.
9. Find trig functions for any size angle.
10. Identify and prove trigonometric identities.
11. Change angle measures from degrees to radians and vice versa.
12. Solve for unknown parts of oblique triangles.
13. Graph vectors and solve for the resultant.
14. Graph the trigonometric functions.
15. Understand how mathematics relates to the students' selected vocation or trade area.

CORRELATIONS OF TRADE/SUBJECT COMPETENCIES
WITH CONNECTICUT'S COMMON CORE OF LEARNING

LIST OF STUDENT COMPETENCIES OR ANTICIPATED OUTCOMES	RELATED COMMON CORE OF LEARNING COMPONENTS		
TRADE/SUBJECT: PRE-TECH MATHEMATICS	ATTITUDES AND ATTRIBUTES	SKILLS AND COMPETENCIES	UNDERSTANDINGS AND APTITUDES
Be able to use the rules of Algebra to solve stated word problems.		E6,E7, E8,E9	F2, F4, F7
Be able to find solutions to systems of equations.		E6,E7, E8,E9	F2
Be able to graph evaluation for solutions.		D7	
Be able to solve quadratic equations.		E6,E7, E8,E9	F1
Be able to solve inequalities.		E3	
Be able to solve ratio, proportion, and variation problems.		D3	
Be able to identify the six trigonometric ratios.		D1	
Be able to solve for unknowns in right triangle problems.		D3 E6,E7, E8,E9	
Be able to find trig functions for any size angle.	B1	D2, D4	
Be able to identify and prove trigonometric identities.			F1
Be able to change angle measures from degrees to radians and vice versa.		D1	
Be able to solve for unknown parts of oblique triangles.			F2
Be able to graph vectors and solve for the resultant.		D7	
Be able to graph the trigonometric functions.		D7	
Understand how mathematics relates to the student's selected vocation or trade area.	A3, D3	F1	B3,B4,B5, B6,F2,F3

x

PERSONAL GOALS FOR STUDENTS

The Student will demonstrate a willingness to:

1. Do assigned tasks without constant supervision.
2. Work as a team member and assist others.
3. Observe safety rules.
4. Maintain books, equipment and/or work stations.
5. Contribute to maintaining a positive educational environment within the classroom.

PRE-TECH MATH HISTORY

Pre-Tech Math is a course which was initiated in cooperation with Norwalk State Technical College to parallel the course offered at the college for entry level students. The next course offered to these students is Tech Math I followed by Tech Math II.

At the vocational-technical high schools, this course is offered to capable 12th grade students, usually the top group academically. Some schools begin the extensive curriculum in 11th grade. Students who receive a C or better get the Pre-Tech requirement waived by the Technical Colleges.

The course content is Algebra I and II, Trigonometry and a review of computational Geometry.

The book which is used "Essentials of Mathematics" by Russell V. Person and Vernon J. Person is a comprehensive math book--which begins with basic arithmetic and ends with Differential and Integral Calculus.

The topic outlined in the curriculum indicate those which are important to the course, so that students who are successful will be ready for Tech Math I at a technical college in Connecticut.

The unit at which the individual teacher begins the course may vary. It is suggested that the students be asked to take the chapter tests at the end of the introductory Algebra chapters and that the teacher then determine where to begin in order to review the Algebra essentials and prepare the students for the rest of the units.

Units which are not outlined but are included in the book may be used as optional topics.

Since this course is offered to capable students, the curriculum guide contains the topics which all students should be able to accomplish and is not broken down into "all students" and "Levels I, II, and III", as other guides may be.

UNIT I

SOLVING STATED WORD PROBLEMS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to set up and solve word problems.

Student Competencies:

After completing this unit, all students should be able to:

1. Find the correct approach to the solution of a problem.
2. Analyze a problem carefully.
3. Write the correct equation from the given information.
4. Solve the equation.
5. Check the solution to be sure that it satisfies the conditions of the problems.

UNIT II

SPECIAL PRODUCTS AND FACTORING

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to factor all polynomial expressions.

Student Competencies:

After completing this unit, all students should be able to:

1. Find special monomial, polynomial and combination products by multiplication.
2. Find prime factors of an expression.
3. Factor an expression by taking out a common factor.
4. Factor a difference of squares.
5. Factor a perfect square trinomial.
6. Find the missing middle term of a perfect square.
7. Complete the square in a trinomial with the last term missing.
8. Factor a product in the form $(x+a)(a+b)$.
9. Factor expressions of the types $x^2 + px + q$.
10. Factor expressions in the form $(ax + b)(cx + d)$.
11. Factor a trinomial of the types $ax^2 + bx + c$.
12. Factor the sum or difference of two equal powers.
13. Factor by various methods of grouping.

UNIT III

OPERATIONS WITH FRACTIONS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to add, subtract, multiply and divide fractional expressions in algebra.

Student Competencies:

After completing this unit, all students should be able to:

1. Reduce algebraic fractions to lowest terms, using factoring principles if necessary.
2. Add algebraic fractions.
3. Subtract algebraic fractions.
4. Multiply algebraic fractions.
5. Divide algebraic fractions.
6. Manipulate complex fractions to find a solution.

UNIT IV

FRACTIONAL EQUATIONS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to solve fractional equations and word problems which are solved by fractional equations.

Student Competencies:

After completing this unit, all students should be able to:

1. Solve simple fractional equations by the multiplication axiom.
2. Solve fractional equations containing variable denominators by using the least common denominator.
3. Solving literal equations.
4. Solving formulas for any of the unknown quantities.
5. Solving word problems involving fractional equations.

UNIT V

SYSTEMS OF EQUATIONS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to solve systems of equations by various methods.

Student Competencies:

After completing this unit, all students should be able to:

1. Solve systems of equations by addition or subtraction.
2. Solve systems of equations by substitution.
3. Solve systems of equations by comparison.
4. Solve word problems by systems of equations.
5. Determine whether equations are dependent or derived or independent.
6. Solve a system of equations by determinants.

UNIT VI

GRAPHING

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand the process of graphing straight lines on a set of rectangular coordinates.

Student Competencies:

After completing this unit, all students should be able to:

1. Draw a set of rectangular coordinates on a graph paper and identify the principal parts of the set.
2. Locate points on a graph.
3. Graph straight lines by locating points.
4. Solve systems of equations by graph.
5. Find the slope of a line.
6. Identify the equation of a straight line.
7. Write the equation of a line given 2 points.

UNIT VII

EXPONENTS, POWERS AND ROOTS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to work with expressions involving exponents, how to raise expressions to various powers and how square and cube roots can be expressed as powers.

Student Competencies:

After completing this unit, all students should be able to:

1. Find the power of a power.
2. Find the power of a product of several factors.
3. Find the power of a fraction.
4. Use the zero exponent.
5. Use negative exponents.
6. Use fractional exponents.
7. Find roots of numbers using fractional exponents.
8. Put numbers into scientific notation.
9. Multiply and divide very large and very small numbers using scientific notation.

UNIT VIII

RADICALS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to simplify radicals as well as perform the four basic operations of arithmetic using radicals.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify perfect squares and perfect cubes and take the roots.
2. Identify irrational numbers.
3. Simplify radicals.
4. Add and subtract radicals.
5. Multiply radicals.
6. Divide radicals.
7. Eliminate the radical in the denominator of an expression.

UNIT IX

QUADRATIC EQUATIONS

Suggested Instructional Time: 5 days

Unit Objective: After completing this unit, the students should understand various methods for solving second degree equations.

Student Competencies:

After completing this unit, all students should be able to:

1. Solve a pure quadratic equation.
2. Solve a quadratic equation by factoring.
3. Solve a quadratic equation by completing the square.
4. Solve a quadratic equation by formula.
5. Solve word problems involving quadratic equations.

UNIT X

INEQUALITIES

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to solve inequalities and how to graph one or more on a set of coordinate axes.

Student Competencies:

After completing this unit, all students should be able to:

1. Solve an inequality.
2. Graph linear inequalities.
3. Graph a system of inequalities and find the solution.
4. Solve quadratic inequalities.

UNIT XI

RATIO, PROPORTION AND VARIATION

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to find solutions of ratios, proportions, and direct and inverse variation problems.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify ratios.
2. Solve proportions.
3. Solve problems involving direct, point and inverse variations.
4. Find and use the constant of variation.
5. Set up and solve word problems involving variations.

UNIT XII

THE TRIGONOMETRIC RATIOS

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to sketch angles of any size. They should also be able to identify the size, cosine and hangent ratios.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify standard angles.
2. Sketch angles of any size.
3. Identify standard position of an angle with respect to its position on the rectangular coordinate system.
4. Identify the six trigonometric ratios on the set of coordinate axes.

UNIT XIII

TABLE OF TRIGONOMETRIC RATIOS

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to use the trig tables given a particular angle or the function of a given angle.

Student Competencies:

After completing this unit, all students should be able to:

1. Read the table for the functions of a given angle.
2. Read the table for the arc--function on inverse functions.

UNIT XIV

THE RIGHT TRIANGLE

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand the six functions of angles and be able to use them to solve problems.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify the hypotenuse, adjacent side and opposite side in any right triangle.
2. Make the six trigonometric ratios for either acute angle.
3. Solve right triangles for any missing side or angle.
4. Use the six ratios to solve word problems.

UNIT XV

FUNCTIONS OF ANGLES OF ANY SIZE

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to find the six ratios for angles of any size.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify the equivalent angle and sign of function for any angle.
2. Find an angle from a given function value.
3. Find the values of all the functions of an angle from one given function value.

UNIT XVI

TRIGONOMETRIC IDENTITIES

Suggested Instructional Time: 5 days

Unit Objective: After completing this unit, the students should understand trigonometric identities and be able to demonstrate their equalities.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify trigonometric ratios.
2. Use reciprocal relations.
3. Use cofunction relations.
4. Use identities involving squares.
5. Prove identities equal or show that they are not identities.

UNIT XVII

RADIAN MEASURE

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand radians and be able to convert degrees to radian measure and vice versa.

Student Competencies:

After completing this unit, all students should be able to:

1. Change angles from degrees to radians.
2. Change angles from radians to degrees.
3. Identify a solid angle.

UNIT XVIII

SPECIAL ANGLES

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to find the trigonometric of two special triangles--30^0 --60^0 --90^0 45^0 -- 45^0 -- 90^0.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify the measures of the sides and the trigonometric ratios of the 30^0 --60^0 --90^0 triangle.

2. Identify the measures of the sides and the trigonometric ratios of the 45^0 -- 45^0 -- 90^0 triangle.

3. Identify the trigonometric ratios of the quadrantal angles - 0_0, 90^0, 180^0, 270^0 and 360^0.

4. Solve trigonometric equations.

UNIT XIX

COMPOSITE ANGLE FORMULAS

Suggested Instructional Time: 5 days

Unit Objective: After completing this unit, the students should understand how the trigonometric functions are changed when the angles are multiplied or divided by a given number.

Student Competencies:

After completing this unit, all students should be able to:

1. Apply sum and difference formulas.
2. Apply double-angle formulas.
3. Apply half-angle formulas.
4. Apply all formulas to word problems.

UNIT XX

SOLVING OBLIQUE TRIANGLES

Suggested Instructional Time: 5 days

Unit Objective: After completing this unit, the students should understand how to solve for a missing angle or side of any oblique triangle by using the appropriate laws.

Student Competencies:

After completing this unit, all students should be able to:

1. Apply the Law of Sines.
2. Apply the Law of Cosines.
3. Apply the Laws to word problems involving oblique triangles.

UNIT XXI

VECTORS

Suggested Instructional Time: 5 days

Unit Objective: After completing this unit, the students should understand the meaning of vectors and how they can be applied to problems.

Student Competencies:

After completing this unit, all students should be able to:

1. Represent vectors by line segments.
2. Add vectors geometrically.
3. Represent vectors on the coordinate system.
4. Find the resultant.
5. Find the components of a given vector.
6. Add two or more vectors graphically.
7. Add vectors by algebra and trigonometry.
8. Represent vectors as complex numbers.
9. Graph polar coordinates.
10. Multiply vectors.
11. Divide vectors.
12. Find the power of a vector in polar form.
13. Find the root of a vector in polar form.
14. Identify the relationship between vectors and the Pythagorean Theorem.

UNIT XXII

GRAPHS OF THE TRIGONOMETRIC FUNCTIONS

Suggested Instructional Time: 4 days

Unit Objective: After completing this unit, the students should understand how to sketch each graph of a trigonometric function and recognize each one from a graph.

Student Competencies:

After completing this unit, all students should be able to:

1. Graph the sine curve for given values.
2. Graph the cosine curve for given values.
3. Graph the tangent curve for given values.
4. Identify the graphs of the cotangent, secant and cosecant curves.
5. Identify graphs of inverse trig functions.

GEOMETRY

The section on geometry in "Essentials of Mathematics" is comprehensive and a good review of the geometry that the students in Pre-Tech Math should have already had.

The Geometry outline which follows is valuable to present if time permits. With a very capable class, not needing much review of Algebra, and with a facility for learning quickly, the presentation of this material may be possible.

The suggested instructional time brings the total in this outline to more days than the normal year in the vocational-technical school.

UNIT XXIII

PLANE FIGURES

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand lines and angles and their measures, parallel and perpendicular lines, polygons and triangles.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify lines and their relationships i.e., intersecting, parallel, perpendicular.
2. Identify different types of angles.
3. Measure angles.
4. Identify polygons by name when applicable.
5. Identify triangles by type.
6. Identify the different types of quadrilaterals.

UNIT XXIV

MEASUREMENT OF PLANE FIGURES

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to find perimeters and areas of the standard plan figures.

Student Competencies:

After completing this unit, all students should be able to:

1. Find the perimeter and area of a rectangle.
2. Find the perimeter and area of a square.
3. Find the perimeter and area of a parallelogram.
4. Find the perimeter and area of a triangle.
5. Find the perimeter and area of a trapezoid.
6. Convert one unit of area to another unit.

UNIT XXV

THE RIGHT TRIANGLE

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand the Pythagorean Theorem and be able to find the right triangles and their relationships in such figures as an isosceles triangle, and an equilateral triangle.

Student Competencies:

After completing this unit, all students should be able to:

1. Find missing side measures on various kinds of triangles.
2. Isolate the right triangle in certain types of triangles.

UNIT XXVI

CIRCLES

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand the various definitions involved in the study of the circle as well as the study of the circle as well as the procedures for finding the circumference, area or any other missing part given stated values.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify diameter, radius, chord, arc, inscribed angle and other definitions unique to the study of the circle.
2. Find the circumference of any circle.
3. Find the area of any circle.
4. Find the area of a sector of a circle.
5. Find the area of a segment of the circle.

UNIT XXVII

GEOMETRIC SOLIDS: PRISMS

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to find the lateral area and volume of prisms, cubes and irregular solids.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify prism, cube and irregular solids.
2. Find lateral area of the above figures.
3. Find volume of the above figures.

UNIT XXVIII

CYLINDERS

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand the cylinder, its total area and volume, and how to find missing terms in the appropriate formulas.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify a cylinder.
2. Find the volume of a cylinder.
3. Find the lateral area of a cylinder.
4. Find the volume of a hollow cylinder.

UNIT XXIX

PYRAMIDS AND CONES

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand how to find the lateral areas and volumes of pyramids, cones, and frustums of each.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify pyramids, cones and frustums of each.
2. Find the lateral area and volume of a pyramid.
3. Find the lateral area and volume of the frustum of a pyramid.
4. Find the lateral area and volume of a cone.
5. Find the lateral area and volume of the frustum of a cone.

UNIT XXX

THE SPHERE

Suggested Instructional Time: 3 days

Unit Objective: After completing this unit, the students should understand the definitions unique to the sphere and the process for finding the surface area and volume of spheres.

Student Competencies:

After completing this unit, all students should be able to:

1. Identify a sphere with all the parts which are unique to a sphere.
2. Find the surface area of a sphere.
3. Investigate a unit sphere.
4. Find the volume of a sphere.

APPENDIX A

Computer Resource Software

Item	Software		Computer
1.	Math Blaster		Mac
2.	Math Blaster Plus		Apple IIGS/IIe
3.	Alge-Blaster		Apple IIGS
4.	Simple Accounting		Mac
5.	Math Talk		Mac
6.	Jumping Math Flash		Apple IIGS
7.	Math Type		Mac
8.	MacDraft		Mac
9.	Pict-O-Graph		Mac
10.	Geometry		Mac
11.	Calculus		Mac
12.	Problem Solving in Algebra Intro and	Lessons 1 - 7	Apple II GS/IIe
13.	Problem Solving in Algebra	Lessons 8 - 14	Apple II GS/IIe
14.	Problem Solving in Algebra	Lessons 15 - 21	Apple II GS/IIe
15.	Problem Solving in Algebra	Lessons 22 - 30	Apple II GS/IIe
16.	Problem in Algebra	Lessons 31 - 38	Apple II GS/IIe
17.	Geometry - Funky Chicken		Apple II GS/IIe
18	Geometry - Exploring Triangles		Apple II GS/IIe
19.	Estimation - Estimation Invasion		Apple II GS/IIe
20.	Estimation - Round up, Round down		Apple II GS/IIe
21.	Math Skills - Junior High Level		Apple II GS/IIe
22.	Math Skills - Elementry Level		Apple II GS/IIe

APPENDIX B

Recommended Textbook

Person, Russell V. and Person, Vernon J. "Essentials of Mathematics," John Wiley & Sons 1989 New York.

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